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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/734,073
Filing Date: December 12, 2003
Appellant(s): DEGNER ET AL.

MAILED
SEP 19 2007
GROUP 1700

Peter K. Skiff
For Appellants

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 30, 2007 appealing from the Office action mailed September 27, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellants' statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP 1-204424	TAKAO et al.	8-1989
US 4,340,462	KOCH	7-1982
EP 0 346 055	OKAZAKI et al.	12-1989
JP 61-243170	SHIGERU	10-1986
JP 61-279672	YAMADA	12-1986

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 16-19, 30, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 01-204424 (Takao).

With respect to claims 1, 3-5, and 16-17, Takao teaches a reactor of the type having a first electrode for supporting a substrate, an opposed electrode, and means for

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producing a plasma therebetween, wherein the opposed electrode has one face exposed to the first electrode and an opposite face connected to an electrical source and a thermal sink (figure 1, items 7, 5, 13, 14 and page 2), the improvement comprising an opposed electrode including (a) an electrode plate composed of a substantially pure material (amorphous carbon) and having a substantially uniform thickness (figure 1, item 7), and (b) a support frame composed of an electrically and thermally conductive material (aluminum) bonded to a back face of the plate, whereby the support frame is connected to the electrical source and thermal sink and a front face of the plate which is exposed to the first electrode is substantially free from protuberances (page 8, and figure 1, items 4 and 7); wherein the electrode plate comprises a disk (figure 1, item 7); wherein the disk includes a plurality of apertures therethrough to permit the flow of a reactant gas into the space between the electrodes (figure 1, item 7, apertures); wherein the support frame comprises a ring which is secured about the periphery of the disk (figure 1, item 7, ring); wherein the electrode plate is composed of a pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2); wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel (page 4).

With respect to claims 18, 19, 30, and 31, Takao teaches an electrode composed of a substantially pure material (amorphous carbon) and having a substantially uniform

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thickness (figure 1, item 7); and a support ring bonded about the periphery of one face of the disk (where the electrode body 4 is bonded around the periphery of electrode 7), leaving the other face substantially flat and free from protuberances, wherein the support ring is composed of an electrically and thermally conductive material (where the electrode body 4 is made of aluminum); wherein the disk includes a plurality of apertures to permit gas flow therethrough (figure 1, item 7, apertures); wherein the electrode plate is composed of a pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2); wherein the electrically and thermally conductive material is selected from the group consisting of graphite, aluminum, copper, and stainless steel (page 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 1 above, and further in view of US 4,340,462 (Koch).

Koch teaches the opposed electrode is mounted in an assembly having an insulating ring which is flush with the entire periphery of the exposed face, whereby the support frame is protected from exposure to the plasma (figure 3, item 20, 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the structure of the electrode in order to provide a sealable chamber (Koch, col. 3, ll. 60-67).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 3 above, and further in view EP 346055 (Okazaki).

Okazaki teaches the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk (figure 2, item 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki page 4).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 3 above, and further in view JP 61-243170 (Shigeru).

Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (figure 1, item 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in

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order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2).

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 5 above.

Takao teaches a parallel plate electrode reactor to hold semiconductor wafers (page 2). Because Takao teaches substantially the same machine as applicants to perform plasma etching (page 2 and applicant's abstract), the claimed ranges would have been obvious in order to obtain a high precision etching apparatus (page 2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 1 above, and further in view of JP 61-279672 (Yamada).

Yamada teaches the plate is bonded to the support frame by means of a bonding layer, which has a low vapor pressure, bonding layer is formed by soldering. (page 3, ll. 4-7). It would have been obvious to one of ordinary skill in the art at the time of the

invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada page 3, ll. 1-20).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 13 above, and further in view JP 61-243170 (Shigeru).

Shigeru teaches wherein at least one of the plate and the support frame is metallized (page 2, ll. 14-20). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the plate and the support frame in order to form a strong bond between the indium and the substrate (see Shigeru page 2).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 10 above, and further in view of JP 61-243170 (Shigeru).

Shigeru teaches the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding (p. 2, ll. 19-20 and figure 3, item 102). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize the bonding layer is free from voids and uniform electrical and thermal conductivities in order to form a strong bond to the substrate (see Shigeru page 2).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above, and further in view EP 346055 (Okazaki).

Okazaki teaches the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk (figure 2, item 22). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki page 4).

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above, and further in view JP 61-243170 (Shigeru).

Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (figure 1, item 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2).

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above.

Takao teaches a parallel plate electrode reactor to hold semiconductor wafers (page 2). Because Takao teaches substantially the same machine as applicants to

perform plasma etching (page 2 and applicant's abstract), the claimed ranges would have been obvious in order to obtain a high precision etching apparatus (page 2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

Claims 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above, and further in view of JP 61-279672 (Yamada).

Yamada teaches the plate is bonded to the support frame by means of a bonding layer, which has a low vapor pressure, bonding layer is formed by soldering. (page 3, ll. 4-7). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada page 3, ll. 1-20).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 27 above, and further in view JP 61-243170 (Shigeru).

Shigeru teaches wherein at least one of the disk and the ring is metallized (page 2, ll. 14-20). It would have been obvious to one of ordinary skill in the art at the time of

the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the disk and the ring in order to form a strong bond between the indium and the substrate (see Shigeru page 2).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) and JP 61-279672 (Yamada) as applied to claim 24 above, and further in view of JP 61-243170 (Shigeru).

Shigeru teaches the bonding layer is substantially free from voids and has substantially uniform electrical and thermal conductivities through the region of bonding (p. 2, ll. 19-20 and figure 3, item 102). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize the bonding layer is free from voids and uniform electrical and thermal conductivities in order to form a strong bond to the substrate (see Shigeru page 2).

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 01-204424 (Takao) as applied to claim 18 above, and further in view JP 61-243170 (Shigeru).

Shigeru teaches a backing plate is bonded around the periphery of the silicon oxide plate. The material of the backing plate Cu has a higher CTE than the electrode plate. When cooled, the differential contraction imparts the stress. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the

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apparatus of Takao to utilize the particular structure of the backing plate and electrode plate in order to obtain uniform film formation (see Shigeru page 2).

Claims 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-243170 (Shigeru) in view of JP 61-279672 (Yamada).

Shigeru teaches bonding the backing plate to an electrode plate (silicon dioxide) at elevated temperature (170 C, translation page 2), wherein the material of the electrode plate (Cu) has a higher coefficient of thermal expansion than that of the electrode plate (silicon dioxide); and allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress (page 2); Yamada teaches forming an electrode assembly including a support ring and an electrode plate (figure 3, item 38); wherein the elevated temperature is chosen to be above an expected operating temperature of the electrode assembly (page 2); wherein the electrode plate is formed from a substantially pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides (page 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the backing plate and electrode plate to utilize forming an electrode assembly having a support ring and electrode plate, in order to provide a sputtering apparatus that enables a high purity film formation (see Yamada page 2).

(10) Response to Argument

With regard to the appellants' remarks/arguments on pages 13-105 of the Appeal Brief, the appellants have presented sections A-Q under the heading VII. Argument on the bottom of page 13. Sections B-Q include arguments addressing specific claims that correspond to sections 1-14 under VI. Grounds of Rejection to be Reviewed on Appeal on pages 12 and 13 of the brief. The examiner also notes that section 14 (on page 13) incorrectly states "Shigeru *and* Yamada". Instead, this should read "Shigeru *in view of* Yamada", as set forth in the rejection of claims 33-36 in the above paragraph.

Regarding **Section A** on pages 13-18 of the brief, the appellants provide subsections 1-4 addressing the Legal Standards of "Plain Meaning" of Words in a Claim, Anticipation, Obviousness, and Secondary Evidence of Nonobviousness. Although the appellants have not addressed any specific claims under appeal in section A on pages 13-18 of the brief, these issues will be addressed in the following sections.

Regarding **Section B** on pages 18-28 of the brief, which corresponds to section 1 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claims 1, 3-5, 16-19, 30, and 31 stand rejected under 35 USC 102(b) as allegedly anticipated by JP 01-204424 ("Takao")", the issues are as follows:

With respect to independent claim 1, the appellants state (in subsection 2 on page 19 of the brief) that claim 1 is written in Jepson format. In subsection 3 (on pages 19 and 20 of the brief), the appellants state that Takao is missing claim features,

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specifically the combination of both a “thermal sink” and a “support frame”. In other words, the appellants are stating that Takao must only have one structure and not the other. The examiner respectfully disagrees with this argument for the following two reasons:

1) First, as the appellants are aware, the text (preamble) of a Jepson claim prior to “the improvement” is considered as admitted prior art. In this instance, a “thermal sink” is a limitation prior to the term “improvement”, and is thus admitted prior art. Although the “support frame” is present after the term “improvement”, this structure is also present in the Takao reference in the form of electrode body 4 (see Figure 1 of Takao). The appellants correctly state (in the last full paragraph on page 20 of the brief) that “Takao's electrode 4 is considered the claimed support frame”. On the basis of claim 1 being a Jepson claim, Takao is an anticipatory reference under 35 USC 102(b).

2) Second, and more importantly, Takao discloses both a “thermal sink” and a “support frame”, such that claim 1 would be anticipated by Takao -- even in the absence of Jepson claim language. As shown in Figure 1 of Takao, electrode body 4 corresponds to the “support frame”, to which both the appellants and examiner agree. In addition, the “thermal sink” corresponds to reference number 5 in Figure 1 of Takao, which is a “flow path for cooling” (see page 3 of the translation of Takao). This “flow path for cooling” is a cooling means (not shown) that serves as a thermal sink, thus removing heat via its attachment to electrode body 4. In other words, an attached structure (in this case, the cooling means) that is operable to remove heat from another

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structure of higher temperature is a "thermal sink". In conclusion, Takao indeed discloses both a "thermal sink" and a "support frame".

Regarding another of the appellants' major arguments, the appellants state (in the two full paragraphs on page 20 of the brief) that "Moreover, opposed surfaces of Takao's electrode 7 and electrode 4 are unbonded and the front face of Takao's electrode 7 is not substantially free from protuberances due to the presence of ring 12 overlying the electrode 7". The appellants also define "protuberances" as "something that protrudes" (see 1st full paragraph on page 25 of the brief). The examiner respectfully disagrees with the appellants on this issue, as the ring 12 is a separate structure overlying the electrode 7, and thus cannot be considered as "protuberances" of the electrode 7 itself. As shown in Figure 1 of Takao, electrode 7 comprises a graphite disk that includes a plurality of apertures (holes 10), as well as a sealed ring 12 that is secured around the periphery of the disk (electrode 7), all features of which additionally anticipate claims 3-5 and 16 of the appellants' claims. Clearly, the electrode 7 (electrode disk), when taken alone, only includes a plurality of apertures (holes 10), which would not be considered as protuberances. Hence, Takao discloses the limitation "substantially free from protuberances" of independent claim 1.

Another of the appellants' major arguments addresses definitions of the terms "bonding" and "bonded". The appellants state (throughout pages 19-25 of the brief) that "opposed surfaces of Takao's electrode 7 and electrode 4 are unbonded" (page 20 of brief), and "the '456 patent used the term "bonding" or "bonded" to refer to a joint or "bond" between opposing surfaces rather than unbonded surfaces clamped together by

a mechanical structure..." (page 24 of brief). The appellants' subheading 4 (bottom of page 20) states that "bonded" does not mean "clamping together unbonded surfaces by mechanical structure". The appellants also cite passages of the specification (on pages 22-24 of the brief) for the purposes of supporting their alleged definition of "bonding" versus the teachings of the Takao reference. In other words, the appellants argue that Takao does not teach that the electrode 7 is "bonded" to the frame 4. The appellants also state that "bonding" would be given a (comparatively narrow) definition of joining by "soldering", "brazing", and "adhesive joints" (see pages 24 and 25 of brief). The examiner respectfully disagrees with these statements. During patent examination, the pending claims must be "given the broadest reasonable interpretation.". Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). In the instant case, the broadest reasonable interpretation of the term "bonded" would mean "something that fastens things together.". In applying the *Prater* test by giving the claim its broadest reasonable interpretation, it is the examiner's position that the insulating ring coupled with the sealed ring bonds or fastens the electrode (7) to the frame (4). As a result, the claim 1 limitation "bonded to a back face of the plate" is anticipated by Takao.

Regarding dependent claims 3-5, 16, and 17 (see subheading 5 at the top of page 26), these features are also disclosed in Takao. As shown in Figure 1 of Takao, electrode 7 comprises a graphite disk that includes a plurality of apertures (holes 10), as

well as a sealed ring 12 that is secured around the periphery of the disk (electrode 7), all features of which additionally anticipate claims 3-5 and 16 of the appellants' claims. For claim 17, the support frame comprises a thermally conductive material in the form of aluminum (see the above 35 USC 102(b) rejection section).

With respect to independent claim 18 (in reference to subsections 6-8 on pages 26-28 of the brief), the appellants state that Takao allegedly fails to disclose "(1) the claimed support ring and (2) a bond between Takao's electrode 7 and a support ring" and "Takao's electrode 7 would not be substantially flat and free from protuberances" (paragraph bridging pages 26 and 27). The examiner respectfully disagrees, and these arguments are similar to what have been addressed in the above sections. As set forth by Takao (Figure 1 and page 3 of translation, as well as in the 35 USC 102(b) rejection section), the support frame (electrode body 4) comprises a ring (sealed ring 12) which is secured about the periphery of the disk (electrode 7). Definitions of the term "bond" between Takao's electrode 7 and a support ring" have been set forth above, as the broadest reasonable interpretation of the term "bond" would include "something that fastens things together.". In applying the *Prater* test by giving the claim its broadest reasonable interpretation, it is the examiner's position that the insulating ring coupled with the sealed ring bonds or fastens the electrode (7) to the frame (4). As a result, the claim 18 limitation "a support ring bonded about the periphery of one side of the disk" is anticipated by Takao. The argument addressing the "protuberances" has also been addressed above, as the ring 12 is a separate structure overlying the electrode 7, and thus cannot be considered as "protuberances" of the electrode 7 itself. As shown in

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Figure 1 of Takao, electrode 7 comprises a graphite disk (having a flat surface) that includes a plurality of apertures (holes 10), as well as a sealed ring 12 that is secured around the periphery of the disk (electrode 7). As discussed previously, the electrode 7, when taken alone, only includes a plurality of apertures (holes 10), which would not be considered as "protuberances". Hence, Takao discloses the limitation "substantially flat and free from protuberances" of independent claim 18.

Regarding dependent claims 19, 30, and 31 (in reference to subsection 9 on page 28 of the brief), the examiner respectfully disagrees with the appellants, as Takao discloses that the disk 7 includes a plurality of apertures 10 and is comprised of graphite (claims 19 and 30), as well as that the support frame comprises a thermally conductive material in the form of aluminum (claim 31). It is noted that dependent claims 19, 30, and 31 (dependent from independent claim 18) are similar in scope to dependent claims 4, 16, and 17, respectively, which are dependent from independent claim 1.

In concluding **Section B** of the brief, the appellants state (in the last paragraph on page 25) their three major arguments that allegedly support distinguishing features over Takao, all of which have been addressed in the above paragraphs. As a result, it is the examiner's position that Takao anticipates the claimed features of "(1) a support frame connected to a thermal sink, (2) a bond between opposed surfaces of an electrode and the support frame, and (3) a front face of the electrode substantially free from protuberances.". In summary, it is the examiner's position that the 35 USC 102(b) rejections of claims 1, 3-5, 16-19, 30, and 31 in view of Takao be maintained.

Regarding **Section C** on pages 28-36 of the brief, which corresponds to section 2 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claim 2 stands rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of US Patent No. 4,340,462 ("Koch")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 (as set forth above), from which claim 2 depends. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 33 under subsection 2. The appellants argue that claim 2 allegedly distinguishes over Takao in view of Koch due to the limitation "an insulating ring which is flush with the entire periphery of the exposed face, whereby the support frame is protected from exposure to the plasma". In other words, the appellants are arguing that the term "flush" means "having surfaces in the same plane" or "arranged with adjacent sides, surfaces, or edges close together" (see 1st full paragraph on page 29). The examiner respectfully disagrees, as Koch discloses that an opposed electrode is mounted in an assembly having an insulating ring which is flush with the entire periphery of the exposed face, whereby the support frame is protected from exposure to the plasma (figure 3, item 20, 22). Regarding items 20 and 22 of Figure 3, Koch also states (in column 8, lines 18-24), "The received terminal end of the electrode housing 14 is sealed by an annular-shaped, ceramic insulating ring 20 surrounding a disk-shaped electrically conductive electrode 22. The planar surfaces of the ring 20 and the electrode 22 are aligned perpendicular to the cylindrical axis of the electrode housing 14.". From this disclosure of Koch, planar surfaces that are aligned

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perpendicular (while being in contact with one another – see Figure 3), would be considered as structures that are “flush” with one another. As a result, the appellants’ arguments (in subsection 2 on pages 29 and 30) that claim features are missing in the combined references are in error. Furthermore, the appellants admit that Takao’s insulating rings 11 and 12 are “flush” with electrode 7 and protect the electrode assembly from the plasma (see last paragraph on page 30), but Koch discloses that the insulating ring is “flush” with the entire periphery of the (disk) electrode.

Throughout pages 31-33, the appellants have provided additional arguments addressing the alleged deficiencies of the electrode assembly of Koch (the secondary reference under 35 USC 103(a)), despite the fact that Takao (the corresponding primary reference) discloses all the claimed features of independent claim 1, as well as a substantial portion of dependent claim 2. The examiner respectfully disagrees with these arguments, as the arguments generally attack the references individually (in particular, the Koch reference), rather than what one of ordinary skill in the art would have found obvious upon review of their teachings as combined. In response to appellants’ arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In addition, the appellants argue that the examiner allegedly has not established a *prima facie* case of obviousness per MPEP 2143 (see last paragraph on page 30, and throughout page 33). The examiner respectfully disagrees, as the teachings of Koch

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are advantageous for providing a sealable chamber for the electrode assembly (see Koch, col. 3, ll. 60-67). In response to appellants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the structure of the electrode in order to provide a sealable chamber (Koch, col. 3, ll. 60-67).

Regarding the appellants' statement of rebuttal evidence addressing the composite electrode advantages (subsection 3 on pages 34-36), the appellants' conclude subsection 3 by stating "the evidence of nonobviousness outweighs any *prima facie* case of obviousness..." and "evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness". However, in referring to pages 34-36 of the appellants' brief (and throughout prosecution of the application), the examiner is unable to find any such evidence of unobvious or unexpected advantageous properties that would distinguish over the prior art references.

In concluding **Section C** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 2 over Takao in view of Koch be maintained.

Regarding **Section D** on pages 36 and 37 of the brief, which corresponds to section 3 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claim 6 stands rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of EP 346055 ("Okazaki")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 and dependent claim 3 (as set forth above), from which claim 6 depends. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 38 under subsection 2. The appellants argue that claim 6 allegedly distinguishes over Takao in view of Okazaki due to the limitation "the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk". In subsections 2-4 on pages 36 and 37, the appellants' major argument addressing claim 6 is that there allegedly are no concentric rings present in Okazaki. With reference to the above 35 USC 103(a) rejection of claim 6, the examiner respectfully disagrees with this argument. Okazaki teaches that the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk (figure 2, item 22). Regarding item 22 of Figure 3 of Okazaki, the figure includes concentric rings 22 that serve to uniformly diffuse the glow discharge. The concentric rings 22 meet the scope of plain meaning of the term "ring" as set forth in claim 6. Although the appellants state "the combination of Takao and Okazaki cannot possibly suggest the combination of features recited in claim 6", the examiner respectfully disagrees, as a *prima facie* case of obviousness has been

established under 35 USC 103(a). In response to appellants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki, page 4).

In concluding **Section D** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 6 over Takao in view of Okazaki be maintained.

Regarding **Section E** on pages 38-45 of the brief, which corresponds to section 4 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claim 7 stands rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of JP 61-243170 ("Shigeru")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 and dependent claim 3 (as set forth above), from which claim 7 depends. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 44 under subsection 8. The appellants argue that claim 7 allegedly distinguishes over Takao in view of Shigeru due to the limitation "the support frame comprises a flat plate

which is secured to and covers substantially the entire opposite face of the electrode disk". Throughout subsections 2-10 on pages 38-45, two of the appellants' major arguments against claim 7 are that the combination of references allegedly uses improper hindsight and that the teachings of Shigeru "would go against Takao's teachings" (see subsections 3 and 4 on page 39). With reference to the above 35 USC 103(a) rejection of claim 7, the examiner respectfully disagrees with these arguments, as Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (see translation and figure 1, item 3). The flat plate disclosed by Shigeru is a heat radiating backing plate (3) with gold plating, and is properly combined with Takao, as it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2). In response to appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In addressing the appellants' argument that the teachings of Shigeru "would go against Takao's teachings" (page 39), the appellants are generally attacking the references in a

piecemeal manner, rather than what one of ordinary skill in the art would have recognized to be obvious. In response to appellants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

On pages 39 and 40 of the brief (under subheading 5), the appellants state that Shigeru has been misinterpreted. The examiner respectfully disagrees. As previously discussed, Takao sets forth all limitations for which the appellants are providing arguments, with the exception of the "support plate comprises a flat plate which is secured..." of dependent claim 7. Shigeru clearly sets forth a heat radiating backing plate 3 which covers another plate, in the form of silicon dioxide disk plate 1, which is also an electrode disk. The examiner's interpretation of Shigeru is not only clear, but its combination with Takao is also fully supported under a *prima facie* case of obviousness (see above 35 USC 103(a) rejection section addressing claim 7). Hence, the teachings of Shigeru do not destroy the function of the electrode plate of Takao, as the appellants state in subsection 7 (on page 42). Regarding the 1st full paragraph on page 43, the examiner respectfully disagrees with the appellants' allegation of "impermissible hindsight by not offering any evidence of a motivation to combine". As previously set forth above, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to

the backing plate (see Shigeru page 2). This is proper motivation and cannot be considered as a "conclusory statement" by one of ordinary skill in the art. Furthermore, in reference to pages 43 and 44 of the appellants' brief, the appellants have not provided any evidence of a "reasonable expectation of success" that would distinguish over the prior art references.

In concluding **Section E** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 7 over Takao in view of Shigeru be maintained.

Regarding **Section F** on pages 45 and 46 of the brief, which corresponds to section 5 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claims 8-9 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 and dependent claims 3 and 5 (as set forth above), from which claims 8 and 9 depend. The appellants argue that claims 8 and 9 allegedly distinguish over Takao. Claims 8 and 9 set forth ranges of diameters and thicknesses of the (electrode plate) disk. In subsections 2 and 3 on pages 45 and 46, the appellants' major argument is that Takao (as taken alone) fails to disclose and/or suggest the claimed ranges. The examiner respectfully disagrees, as Takao teaches substantially the same machine as that disclosed by the appellants, both of which are operable to perform plasma etching (page 2 and appellants' abstract). As a result of the teachings of Takao, the claimed ranges would have been obvious for obtaining a high precision etching apparatus (page

2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). In summary, Takao suggests the features of claims 8 and 9 under 35 USC 103(a), as one of ordinary skill in the art would have recognized.

In concluding **Section F** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 8 and 9 over Takao be maintained.

Regarding **Section G** on pages 46-59 of the brief, which corresponds to section 6 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claims 10-13 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of JP 61-279672 ("Yamada")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 (as set forth above), from which claims 10-13 depend. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 47 (under subsection 2) and at the top of page 49 (under subsection 4). Regarding the features of claims 10-13, Yamada teaches that the plate is bonded to the support frame by means of a bonding layer (claim 10), which has a low vapor pressure (claim 11), and a bonding layer is formed by soldering with solder of indium of claims 26 and 27 (see page 3, ll. 4-7 of

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translation). Since it is established that Yamada discloses all features of dependent claims 10-13, the question arises regarding whether Yamada is properly combined with Takao to establish a *prima facie* case of obviousness. The examiner respectfully asserts that a *prima facie* case has been established, as Yamada would incorporate further advantageous features to the teachings of Takao. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada, page 3, ll. 1-20).

The examiner respectfully disagrees with the appellants' allegations of improper hindsight (page 48 under subsection 3; and pages 52, 53, and 55, under subsection 6). In response to appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In subsection 4 (pages 48 and 49), the appellants state that Yamada only includes "isolated teachings" that are allegedly improper to combine with the teachings of Takao (see paragraph bridging pages 48 and 49), as well as "there would be no reason to look to Yamada for a solution to a problem which does not exist in Takao" (last full paragraph on page 49).

Regarding the “isolated teachings” argument, the examiner reminds the appellants that Takao discloses all features of independent claim 1, including the “bonded” limitation. Yamada is thus necessary to combine with Takao only for the “bonding layer” (which is clearly more specific than the broad term “bonded”), namely indium solder, as presented in appellants’ claims 12 and 13. The teachings of this combination of references are not “isolated teachings”. Rather, both references are in similar fields, as one of ordinary skill in the art would have recognized. Furthermore, the appellants are conducting piecemeal analysis of the references. In response to appellants’ arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In addition, there would be a reason to look to Yamada for a solution to a problem which allegedly does not exist in Takao, as using solder as a bonding agent would be advantageous over forms of mechanical attachment, such as clamping, as indium solder is operable to affix the target to the base of Yamada (and for selectively removing the target from the base with application of relatively low heating, as one of ordinary skill in the art would have recognized).

The advantages of the teachings of Yamada would also establish a reasonable expectation of success, contrary to the appellants’ statement in the middle of page 50 under subsection 5. The combination of references establish a *prima facie* case of obviousness for the reasons set forth above, and the appellants have not provided any

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evidence to rebut their statement that a "reasonable expectation of success" would not be established. Despite the appellants' statements of advantages of their invention on pages 51-53 (under subsection 6), the examiner has previously stated that the combination of references are not subject to analysis individually, but rather what the combined teachings would be in view of one of ordinary skill in the art. In other words, the examiner has indeed analyzed the "subject matter as a whole" (see 1st full paragraph on page 53), which further establishes that the 35 USC 103(a) rejections of claims 10-13 are proper. Regarding the impermissible picking and choosing of elements (see bottom of page 54), the examiner has already established that Takao disclose all features of claims 1 and 10-13 except a bonding layer comprising solder. Yamada clearly discloses all features of claims 10-13 as advantageous features for improved bonding (see above motivation in the 35 USC 103(a) rejections of claims 10-13). Regarding subsection 7 on pages 56-59, the appellants' statement of rebuttal evidence addressing the composite electrode advantages (in particular on page 58), the appellants' state, "Such improvements over the clamped electrode of Takao are indicia of unobviousness which rebut any *prima facie* obviousness based on the combination of Takao and Yamada" (1st full paragraph on page 57), and "evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed element shares with the prior art, can rebut *prima facie* obviousness" (bottom of page 58). However, in referring to pages 56-59 of the appellants' brief (and throughout prosecution of the application), the examiner is unable to find any such evidence of

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unobvious or unexpected advantageous properties that would distinguish over the prior art references.

In concluding **Section G** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 10-13 over Takao in view of Yamada be maintained.

Regarding **Sections H and I** on pages 59-68 of the brief, which corresponds to section 7 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claims 14-15 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao and Yamada and further in view of Shigeru", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 1 (as set forth above), and Takao in view of Yamada discloses and/or suggests all features of dependent claims 10-13, from which claims 14 and 15 depend. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 60 (under subsection 2 of Section H) and in the paragraph bridging pages 63 and 64 (under subsection 2 of Section I). Furthermore, Takao in view of Yamada discloses and/or suggests claims 10-13 as set forth in above Section G. Claim 14 includes that at least one of the plate and the support frame are metallized, and claim 15 includes a bonding layer substantially free from voids and has substantially uniform electrical and thermal conductivities.

Regarding claim 14 (in view of the Shigeru reference), Shigeru teaches that at least one of the plate and the support frame is metallized, as the backing plate is

deposited with indium (see Summary of the Invention on page 2 of the translation). Under subsection 3, the appellants again argue that the "subject matter as a whole" should always be considered in determining the obviousness of an invention under 35 USC 103 (see top of page 61). The appellants discuss the advantages of their invention in the paragraph bridging pages 61 and 62. Although the examiner agrees with the statement that the "subject matter as a whole" should always be considered in establishing obviousness, the teaching of a metallized backing plate in Shigeru is properly combined with Takao in view of Yamada, as it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the plate and the support frame in order to form a strong bond between the indium and the substrate (see Shigeru page 2). In response to appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Regarding claim 15 (in view of the Shigeru reference), Shigeru teaches that at least one of the plate and the support frame is metallized, as the backing plate is deposited with indium (see Summary of the Invention on page 2 of the translation). As the appellants state at the bottom of page 65, bonding would be "carried out in a

vacuum chamber" to prevent voids, and Shigeru indeed discloses such a vacuum chamber for use in removing atmospheric impurities. As disclosed in Shigeru, the use of a vacuum chamber to remove voids/impurities leads to a metallized product (which includes indium) that would be more uniform in structure, thus leading to substantially uniform electrical and thermal conductivities through the region of bonding (claim 15). Regarding the appellants' allegations of impermissible hindsight, the appellants are referred to the above adjacent paragraph). Furthermore, the teachings of Shigeru do not "teach away" from the combined teachings of Takao and Yamada (see middle of page 67), as all references are related to similar apparatuses and provide a combination under 35 USC 103(a) that establishes a proper *prima facie* case of obviousness. In response to appellants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao in view of Yamada, by using the bonding layer that is substantially free from voids, as taught by Shigeru, in order to form a strong bond between the indium and the substrate (see Shigeru page 2). For the reasons set forth above, the advantages of the teachings of Shigeru would also establish a reasonable expectation of success, contrary

to the appellants' statement at the top of page 68 under subsection 4. Furthermore, the appellants have not provided any evidence of a "reasonable expectation of success" that would distinguish over the prior art references.

In concluding **Sections H and I** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 14 and 15 over Takao in view of Yamada, and further in view of Shigeru, be maintained.

Regarding **Section J** on pages 68-70 of the brief, which corresponds to section 8 under VI. Grounds of Rejection to be Reviewed on Appeal on page 12 of the brief, which states "Claim 20 stands rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of EP 346055 ("Okazaki")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), from which claim 20 depends. Although differing in dependency, it is noted that claim 20 is similar in scope as claim 6 (dependent on independent claim 1 and claim 3), as set forth in above Section D. The appellants argue that claim 20 allegedly distinguishes over Takao in view of Okazaki due to the limitation "the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode disk". In subsections 2-4 on pages 69 and 70, the appellants' major argument addressing claim 20 is that there allegedly are no concentric rings present in Okazaki. With reference to the above 35 USC 103(a) rejection of claim 20, the examiner respectfully disagrees with this argument. Okazaki teaches that the support frame comprises a plurality of concentric rings secured to the opposite face of the electrode

disk (figure 2, item 22). Regarding item 22 of Figure 3 of Okazaki, the figure includes concentric rings 22 that serve to uniformly diffuse the glow discharge. The concentric rings 22 meet the scope of plain meaning of the term "ring" as set forth in claim 20. Although the appellants state "the combination of Takao and Okazaki cannot possibly suggest the combination of features recited in claim 20", the examiner respectfully disagrees, as a *prima facie* case of obviousness has been established under 35 USC 103(a). In response to appellants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the concentric rings on the opposite side of the disk in order to diffuse the glow discharge (Okazaki, page 4).

In concluding **Section J** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 20 over Takao in view of Okazaki be maintained.

Regarding **Section K** on pages 70-77 of the brief, which corresponds to section 9 under VI. Grounds of Rejection to be Reviewed on Appeal on pages 12 and 13 of the brief, which states "Claim 21 stands rejected under 35 USC 103(a) as allegedly

unpatentable over Takao and further in view of JP 61-243170 ("Shigeru")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), from which claim 21 depends. Although differing in dependency, it is noted that claim 21 is similar in scope as claim 7 (dependent on independent claim 1 and claim 3), as set forth in above Section D. For example, Takao discloses all features of limitations (1), (2), and (3) at the bottom of page 76 under subsection 8. The appellants argue that claim 21 allegedly distinguishes over Takao in view of Shigeru due to the limitation "the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk". Throughout subsections 2-10 on pages 70-77, two of the appellants' major arguments against claim 21 are that the combination of references allegedly uses improper hindsight and that the teachings of Shigeru "would go against Takao's teachings" (see subsections 3 and 4 on page 71). With reference to the above 35 USC 103(a) rejection of claim 21, the examiner respectfully disagrees with these arguments, as Shigeru teaches the support frame comprises a flat plate which is secured to and covers substantially the entire opposite face of the electrode disk (see translation and figure 1, item 3). The flat plate disclosed by Shigeru is a heat radiating backing plate (3) with gold plating, and is properly combined with Takao, as it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2). In response to

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appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In addressing the appellants' argument that the teachings of Shigeru "would go against Takao's teachings" (page 71), the appellants are generally attacking the references in a piecemeal manner, rather than what one of ordinary skill in the art would have recognized to be obvious. In response to appellants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

On pages 71-73 of the brief (under subheading 5), the appellants state that Shigeru has been misinterpreted. The examiner respectfully disagrees. As previously discussed, Takao sets forth all limitations for which the appellants are providing arguments, with the exception of the "support plate comprises a flat plate which is secured..." of dependent claim 21. Shigeru clearly sets forth a heat radiating backing plate 3 which covers another plate, in the form of silicon dioxide disk plate 1, which is also an electrode disk. The examiner's interpretation of Shigeru is not only clear, but its combination with Takao is also fully supported under a *prima facie* case of obviousness

(see above 35 USC 103(a) rejection section addressing claim 21). Hence, the teachings of Shigeru do not destroy the function of the electrode plate of Takao, as the appellants state in subsection 7 (on pages 74 and 75). Regarding the 1st full paragraph on page 75, the examiner respectfully disagrees with the appellants' allegation of "impermissible hindsight by not offering any evidence of a motivation to combine". As previously set forth above, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Takao to utilize the flat plate covering the electrode disk in order to reduce the temperature elevation of the plate when bonded to the backing plate (see Shigeru page 2). This is proper motivation and cannot be considered as a "conclusory statement" by one of ordinary skill in the art. Furthermore, in reference to pages 75 and 76 of the appellants' brief, the appellants have not provided any evidence of a "reasonable expectation of success" that would distinguish over the prior art references.

In concluding **Section K** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 21 over Takao in view of Shigeru be maintained.

Regarding **Section L** on pages 77-79 of the brief, which corresponds to section 10 under VI. Grounds of Rejection to be Reviewed on Appeal on page 13 of the brief, which states "Claims 22-23 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), from which claims 22 and 23 depend. Although differing in

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dependency, it is noted that claims 22 and 23 are similar in scope as claims 8 and 9, respectively (dependent on independent claim 1, and claims 3 and 5), as set forth in above Section F. The appellants argue that claims 22 and 23 allegedly distinguish over Takao. Claims 22 and 23 set forth ranges of diameters and thicknesses of the (electrode plate) disk. In subsections 2 and 3 on pages 78 and 79, the appellants' major argument is that Takao (as taken alone) fails to disclose and/or suggest the claimed ranges. The examiner respectfully disagrees, as Takao teaches substantially the same machine as that disclosed by the appellants, both of which are operable to perform plasma etching (page 2 and appellants' abstract). As a result of the teachings of Takao, the claimed ranges would have been obvious for obtaining a high precision etching apparatus (page 2 of Takao). That is, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). In summary, Takao suggests the features of claims 22 and 23 under 35 USC 103(a), as one of ordinary skill in the art would have recognized.

In concluding **Section L** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 22 and 23 over Takao be maintained.

Regarding **Section M** on pages 79-88 of the brief, which corresponds to section 11 under VI. Grounds of Rejection to be Reviewed on Appeal on page 13 of the brief,

which states "Claims 24-27 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of JP 61-279672 ("Yamada")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), from which claims 24-27 depend. Although differing in dependency, it is noted that claims 24-27 are similar in scope as claims 10-13, respectively (dependent on independent claim 1), as set forth in above Section G. For example, Takao discloses all features of limitations (1) and (2) at the top of page 80 and in the middle of page 81 (under subsection 4), and at the bottom of page 82 (under subsection 5). Regarding the features of claims 24-27, Yamada teaches that the plate is bonded to the support frame by means of a bonding layer (claim 24), which has a low vapor pressure (claim 25), and a bonding layer is formed by soldering with solder of indium of claims 26 and 27 (see page 3, ll. 4-7 of translation). Since it is established that Yamada discloses all features of dependent claims 24-27, the question arises regarding whether Yamada is properly combined with Takao to establish a *prima facie* case of obviousness. The examiner respectfully asserts that a *prima facie* case has been established, as Yamada would incorporate further advantageous features to the teachings of Takao. Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of the Takao to utilize bonding the support frame using indium in order to affix the target to the base (see Yamada, page 3, ll. 1-20).

The examiner respectfully disagrees with the appellants' allegations of improper hindsight (page 80 under subsection 3; and pages 85-88, under subsection 6). In response to appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In subsection 4 (pages 80 and 81), the appellants state that Yamada only includes "isolated teachings" that are allegedly improper to combine with the teachings of Takao (see paragraph bridging pages 80 and 81), as well as "there would be no reason to look to Yamada for a solution to a problem which does not exist in Takao" (see paragraph bridging pages 81 and 82).

Regarding the "isolated teachings" argument, the examiner reminds the appellants that Takao discloses all features of independent claim 18, including the "bonded" limitation. Yamada is thus necessary to combine with Takao only for the "bonding layer" (which is clearly more specific than the broad term "bonded"), namely indium solder, as presented in appellants' claims 26 and 27. The teachings of this combination of references are not "isolated teachings". Rather, both references are in similar fields, as one of ordinary skill in the art would have recognized. Furthermore, the appellants are conducting piecemeal analysis of the references. In response to

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appellants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In addition, there would be a reason to look to Yamada for a solution to a problem which allegedly does not exist in Takao, as using solder as a bonding agent would be advantageous over forms of mechanical attachment, such as clamping, as indium solder is operable to affix the target to the base of Yamada (and for selectively removing the target from the base with application of relatively low heating, as one of ordinary skill in the art would have recognized).

The advantages of the teachings of Yamada would also establish a reasonable expectation of success, contrary to the appellants' statement at the bottom of page 82 under subsection 5. The combination of references establish a *prima facie* case of obviousness for the reasons set forth above, and the appellants have not provided any evidence to rebut their statement that a "reasonable expectation of success" would not be established. Despite the appellants' statements of advantages of their invention on pages 83 and 84 (under subsection 6), the examiner has previously stated that the combination of references are not subject to analysis individually, but rather what the combined teachings would be in view of one of ordinary skill in the art. In other words, the examiner has indeed analyzed the "subject matter as a whole" (see paragraph bridging pages 85 and 86), which further establishes that the 35 USC 103(a) rejections of claims 24-27 are proper. Regarding the impermissible picking and choosing of

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elements (see bottom of page 86), the examiner has already established that Takao disclose all features of claims 18 and 24-27 except a bonding layer comprising solder. Yamada clearly discloses all features of claims 24-27 as advantageous features for improved bonding (see motivation in the 35 USC 103(a) rejections of claims 24-27).

In concluding **Section M** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 24-27 over Takao in view of Yamada be maintained.

Regarding **Sections N and O** on pages 88-97 of the brief, which corresponds to section 12 under VI. Grounds of Rejection to be Reviewed on Appeal on page 13 of the brief, which states "Claims 28-29 stand rejected under 35 USC 103(a) as allegedly unpatentable over Takao and Yamada and further in view of Shigeru", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), and Takao in view of Yamada discloses and/or suggests all features of dependent claims 24-27, from which claims 28 and 29 depend. Although differing in dependency, it is noted that claims 28 and 29 are similar in scope as claims 14 and 15, respectively (dependent on independent claim 1 and claims 10-13), as set forth in above Sections H and I. For example, Takao discloses all features of limitations (1) and (2) at the bottom of page 89 (under subsection 2 of Section N) and in the paragraph in the middle of page 93 (under subsection 2 of Section O). Furthermore, Takao in view of Yamada discloses and/or suggests claims 24-27 as set forth in above Section M. Claim 28 includes that at least one of the plate and the support frame are

metallized, and claim 29 includes a bonding layer substantially free from voids and has substantially uniform electrical and thermal conductivities.

Regarding claim 28 (in view of the Shigeru reference), Shigeru teaches that at least one of the plate and the support frame is metallized, as the backing plate is deposited with indium (see Summary of the Invention on page 2 of the translation). Under subsection 3, the appellants again argue that the "subject matter as a whole" should always be considered in determining the obviousness of an invention under 35 USC 103 (see top of page 90). The appellants discuss the advantages of their invention in the 1st full paragraph on page 90. Although the examiner agrees with the statement that the "subject matter as a whole" should always be considered in establishing obviousness, the teaching of a metallized backing plate in Shigeru is properly combined with Takao in view of Yamada, as it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Takao and Yamada to utilize metallizing one of the plate and the support frame in order to form a strong bond between the indium and the substrate (see Shigeru page 2). In response to appellants' argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Regarding claim 29 (in view of the Shigeru reference), Shigeru teaches that at least one of the plate and the support frame is metallized, as the backing plate is deposited with indium (see Summary of the Invention on page 2 of the translation). As the appellants state in the 1st full paragraph of page 94, bonding would be “carried out in a vacuum chamber” to prevent voids, and Shigeru indeed discloses such a vacuum chamber for use in removing atmospheric impurities. As disclosed in Shigeru, the use of a vacuum chamber to remove voids/impurities leads to a metallized product (which includes indium) that would be more uniform in structure, thus leading to substantially uniform electrical and thermal conductivities through the region of bonding (claim 29). Regarding the appellants’ allegations of impermissible hindsight, the appellants are referred to the above adjacent paragraph). Furthermore, the teachings of Shigeru do not “teach away” from the combined teachings of Takao and Yamada (see 1st full paragraph of page 96), as all references are related to similar apparatuses and provide a combination under 35 USC 103(a) that establishes a proper *prima facie* case of obviousness. In response to appellants’ argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to

modify the apparatus of Takao in view of Yamada, by using the bonding layer that is substantially free from voids, as taught by Shigeru, in order to form a strong bond between the indium and the substrate (see Shigeru page 2). For the reasons set forth above, the advantages of the teachings of Shigeru would also establish a reasonable expectation of success, contrary to the appellants' statement at the bottom of page 96 under subsection 4. Furthermore, the appellants have not provided any evidence of a "reasonable expectation of success" that would distinguish over the prior art references.

In concluding **Sections N and O** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 28 and 29 over Takao in view of Yamada, and further in view of Shigeru, be maintained.

Regarding **Section P** on pages 97-101 of the brief, which corresponds to section 13 under VI. **Grounds of Rejection to be Reviewed on Appeal** on page 13 of the brief, which states "Claim 32 stands rejected under 35 USC 103(a) as allegedly unpatentable over Takao and further in view of JP 61-243170 ("Shigeru")", the issues are as follows:

As previously discussed, Takao discloses all features of independent claim 18 (as set forth above), from which claim 32 depends. Claim 32 sets forth that "the supporting ring is pre-stressed to impart a radially inward compression on the electrode disk". However, the appellants argue that claim 32 allegedly distinguishes over Takao in view of Shigeru since the combination of references allegedly lacks claim features and lacks an evidentiary basis for rejection (see subsections 3 and 4 on pages 98-101).

Regarding subsection 3 on page 98, the appellants provide five questions and one

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major argument against claim 32. Namely, the major argument is that “the combined references fail to suggest a support ring pre-stressed to impart a radially inward compression on the electrode disk”. In addressing the appellants’ questions and major argument, the disclosure of Shigeru teaches a backing plate that is bonded around the periphery of the silicon oxide plate, with the advantageous property of obtaining uniform film formation (see Shigeru page 2). The material of the backing plate (Cu) has a higher CTE (coefficient of thermal expansion) than the electrode plate. When cooled, the differential contraction imparts the stress. As the appellants state in the paragraph bridging pages 99 and 100, a silicon dioxide plate (1) and the plate (3) are sufficiently cooled by the water flowing through a cooling water path (5), to which the examiner agrees. On the other hand, the appellants argue that a “pre-stress” would not occur (see questions (3) and (5) on page 98, as well as throughout pages 99-101). The examiner respectfully disagrees with the appellants’ allegation of speculation regarding inherent characteristics of material properties, and thus the appellants are referred to the discussion that follows: “The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain.” In re Heck, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting In re Lemelson, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). In the

instant case, while the examiner agrees that the cooling water cools both plates in Shigeru, it is the examiner's position that the cooling water creates a temperature gradient from the outer plate to the inner plate, which would cause the temperature to gradually decrease. It is the examiner's position that this temperature gradient causes the desired low stress due to the low differential contraction. When the examiner has reason to believe that functional language asserted to be critical for establishing novelty in claimed subject matter may, in fact be an inherent characteristic of the prior art, the burden of proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594. Contrary to the appellants' arguments in the paragraph bridging pages 100 and 101, and as set forth in the above adjacent paragraph, the combination of Takao and Shigeru discloses and/or suggests the features of claim 32. Furthermore, the appellants have not provided any evidence in support of patentability, and the burden of proof remains on the appellants.

In concluding **Section P** of the brief, it is the examiner's position that the 35 USC 103(a) rejection of claim 32 over Takao in view of Shigeru be maintained.

Regarding **Section Q** on pages 102-106 of the brief, which corresponds to section 14 under VI. Grounds of Rejection to be Reviewed on Appeal on page 13 of the brief, which states "Claims 33-36 were rejected under 35 USC 103(a) as allegedly unpatentable over Shigeru and Yamada" (which should instead read "Shigeru in view of Yamada"), the issues are as follows:

Independent claim 33 sets forth a method for forming an electrode assembly including a support ring and an electrode plate, such that the method comprises the steps of bonding the support ring about the periphery of the electrode plate at elevated temperature, wherein the material of the support ring has a higher coefficient of thermal expansion than that of the electrode plate; and allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress. The appellants argue that claim 33 allegedly distinguishes over Shigeru in view of Yamada since the combination of references allegedly lacks claim features and allegedly teaches away from their combination (subsections 3 and 4 on pages 103-106).

Regarding subsection 3 on page 103, the appellants provide a summary of their invention, but argue later (in the paragraph bridging pages 103 and 104) that “desired stress” or “pre-stress” is allegedly not disclosed and/or suggested by Shigeru. For the same reasons as set forth in above Section P, Shigeru in fact discloses this feature, and all features of the claims are disclosed and/or suggested by Shigeru in view of Yamada in what follows. The appellants are again referred to *In re Fitzgerald et al.* 205 USPQ 594 in above Section P. Shigeru teaches bonding the backing plate to an electrode plate (silicon dioxide) at elevated temperature (170 C), wherein the material of the electrode plate (Cu) has a higher coefficient of thermal expansion than that of the electrode plate (silicon dioxide); and allowing the bonded assembly to return to room temperature, whereby the differential contraction imparts the desired stress (page 2 of translation). In addition, Yamada teaches forming an electrode assembly including a support ring and an electrode plate (figure 3, item 38), wherein the elevated

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temperature is chosen to be above an expected operating temperature of the electrode assembly (page 2 of translation); wherein the electrode plate is formed from a substantially pure material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond-coated materials, and titanium oxides. As shown in the 35 USC 103(a) rejections of claims 33-36, the combination of references discloses and/or suggests all claimed features.

Regarding subsection 4 (pages 104-106), in particular on page 105, the examiner respectfully disagrees that the references allegedly teach away from their combination. The teachings of similar apparatuses and methods of their use provide a combination under 35 USC 103(a) that establishes a proper *prima facie* case of obviousness. In response to appellants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the backing plate and electrode plate to utilize forming an electrode assembly having a support ring and electrode plate, in order to provide a sputtering apparatus that enables a high purity film formation (see Yamada page 2). In response to appellants'

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argument that Shigeru cannot be combined with Yamada, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Regarding the impermissible picking and choosing of elements (see 1st full paragraph of page 106), it has already been established that Shigeru discloses and/or suggests the features of claims 33-36, but Yamada further discloses that the elevated temperature is chosen to be above an expected operating temperature of the electrode assembly (see the motivation in the 35 USC 103(a) rejections of claims 33-36).

In concluding **Section Q** of the brief, it is the examiner's position that the 35 USC 103(a) rejections of claims 33-36 over Shigeru in view of Yamada be maintained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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